

REMARKS

This Application has been carefully reviewed in light of the Office Action mailed November 13, 2006. Claims 1-44 and 48-53 were pending in the Application. In the Office Action, Claims 1-44 and 48-53 were rejected. Claims 1-44 and 48-53 remain pending in the Application. Applicant respectfully requests reconsideration and favorable action in this case.

In the Office Action, the following actions were taken or matters were raised:

CLAIM OBJECTIONS

The Examiner objected to Claims 49 and 52 and Claims 50 and 53. Specifically, the Examiner states:

Material cited in claims 49 and 52 regarding a cardinal tensor product is required to be appropriately disclosed in the specification. Also, material cited in claims 50 and 53 regarding ordinal space and ordinal tensor product is required to be appropriately disclosed in the specification.

(Office Action, page 2). Applicant respectfully submits that the material cited in the claims is disclosed in the specification. For example, Applicant submits that at least the following portion of the specification as originally filed discloses the subject matter of claims 49, 50, 52 and 53:

A multi-dimensional correlithm object may be generated by aggregating or otherwise combining correlithm objects 828. For example, point 868 may be represented by a correlithm object formed by concatenating correlithm object X_4 and correlithm object Y_5 . As tensor product of non-string correlithm object state vectors may be used to create a cardinal space, a tensor product of string correlithm object state vectors may be used to create an ordinal space.

(Patent Specification, page 30, line 30 – page 31, line 6)(emphasis added). Therefore, in view of the foregoing, Applicant respectfully submits that the objection to Claims 49, 50, 52 and 53 is improper and should be withdrawn.

SECTION 101 REJECTIONS

Claims 1-44 and 48-53 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Specifically, the Examiner states that the computer system must set forth a practical application of section 101 judicial exceptions to produce a real world result. The

Examiner concludes that the invention is ineligible because it has not been limited to a substantial practical application. Applicant respectfully disagrees.

Applicant respectfully submits that no *prima facie* rejection under 35 U.S.C. § 101 has been established. For example, the Examiner appears to assert that subject matter of Claims 1-53 fall within a 35 U.S.C. § 101 judicial exception to patentable subject matter or a practical application of a 35 U.S.C. § 101 judicial exception to patentable subject matter (Office Action, pages 3 and 4). In this regard, the Examiner appears to assert that Claims 8, 15 and 35 do nothing more than manipulate numbers, and that Claims 22, 39 and 51 are computer program listings per se (Office Action, page 4). Applicant respectfully disagrees.

The Federal Circuit has held that a process claim that applies a mathematical algorithm to "produce a useful, concrete, tangible result without pre-empting other uses of the mathematical principle, on its face comfortably falls within the scope of § 101," *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999). Applicant respectfully submits that Claims 1-53 define patentable subject matter and comply with the requirements of 35 U.S.C. § 101. For example, independent Claim 1 recites a method comprising "receiving an input", "establishing the plurality of real states from the input", "encoding the real states as . . . quantum objects, the quantum objects representing a correlithm object", "projecting the correlithm object to the real space", "determining a plurality of measurement values", "retrieving the projected correlithm object", and "providing output indicating the projected correlithm object." Applicant respectfully submits that independent Claim 1 recites a useful, concrete and tangible result (e.g., at least providing an "output indicating the projected correlithm object"). Additionally, Claim 8 recites "an analyzer operable to determine a plurality of measurement values corresponding to the measurement basis" and "retrieve the projected correlithm object according to the measurement values" (emphasis added). Independent Claim 15 recites a server system operable to "establish a plurality of real states", "encode the real states as a plurality of quantum objects . . . representing a correlithm object", "project the correlithm object", "determine a plurality of measurement values", and "retrieve the projected correlithm object" (emphasis added). Thus, each of Claims 8, 15 and 35 produce a useful, tangible and concrete result in full compliance with 35 U.S.C. § 101.

Additionally, Applicants respectfully submit that Claims 22, 39 and 51 are not "program listings *per se*" as asserted by the Examiner. M.P.E.P. § 2106 clearly sets forth that claims to computer-related inventions can be classified as non-statutory if they fall into the same category as non-statutory claims in other arts, namely natural phenomenon such as magnetism, and abstract ideas or laws of nature which constitute "descriptive material." M.P.E.P. § 2106(IV)(B)(1). Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." M.P.E.P. § 2106(IV)(B)(1). In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when employed as a computer component." M.P.E.P. § 2106(IV)(B)(1). "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data. M.P.E.P. § 2106(IV)(B)(1). A claimed computer program which defines structural and functional interrelationships between the computer program and the rest of the computer which permit the computer program's functionality to be realized is statutory. M.P.E.P. § 2106(IV)(B)(1)(a). Applicant respectfully submits that Claims 22, 39 and 51 are clearly functional descriptive material as the subject matter of Claims 22, 39 and 51 clearly impart functionality when employed as a computer component and are, therefore, statutory.

Accordingly, Applicant respectfully requests that the objection to Claims 1-44 and 48-53 be withdrawn.

SECTION 102 REJECTIONS

Claims 1-44 and 48-53 were rejected under 35 U.S.C. 102(b) as being anticipated by "Quantum Computation and Quantum Information by Nielsen et al. (hereinafter "*Nielsen*"). Applicant respectfully traverses this rejection.

Under 35 U.S.C. § 102, a claim is anticipated only if each and every element as set forth in the claim is found in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 U.S.P.Q.2d 1051 (Fed. Cir. 1987); M.P.E.P. § 2131. In addition, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claims" and "[t]he elements must be arranged as required by the claim." *Richardson v. Suzuki Motor Co.*, 9

U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989); *In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990); M.P.E.P. § 2131.

Of the rejected claims, Claims 1, 8, 15, 22, 29, 30, 31, 35, 39, 43, 44, 45, 48 and 51 are independent. Independent Claim 1 recites: "receiving input associated with a plurality of real states", "establishing the plurality of real states from the input, each real state comprising an element of a real space", "encoding the real states as a plurality of quantum objects, the quantum objects representing a correlithm object", "projecting the correlithm object to the real space using a measurement basis, "determining a plurality of measurement values corresponding to the measurement basis", "retrieving the projected correlithm object according to the measurement values" and " providing output indicating the projected correlithm object" (emphasis added). Applicant respectfully submits that *Nielsen* does not disclose or even suggest each and every limitation recited by independent Claim 1. For example, in the Office Action, the Examiner appears to conclude that *Nielsen* discloses "establishing the plurality of real states from the input, each real state comprising an element of a real space" by referring to the following passage: "Alice begins with *a* and *b*, two strings each of $(4 +)n$ random classical bits." Applicant respectfully submits that neither the portion of *Nielsen* cited by the Examiner *Nielsen* nor any other portion cited by the Examiner establishes "the plurality of real states from the input, each real state comprising an element of a real space" as recited by independent Claim 1. Therefore, for at least these reasons, Applicant submits that *Nielsen* does not anticipate Claim 1.

Independent Claims 8, 15, 22, 30, 31, 39 and 44 recite at least a source operable to "establish[ing] a plurality of real states" and "each real state comprising an element of a real space." Independent Claims 15 and 43 recite a "means for establishing the plurality of real states from the input, each real state comprising an element of a real space." At least for the reasons discussed above with respect to independent Claim 1, Applicant respectfully submits that *Nielsen* fails to disclose or even suggest the limitations as recited by Claims 8, 15, 22, 30, 31, 39, 43 and 44. Therefore, for at least this reason, Applicant respectfully submits that Claims 8, 15, 22, 30, 31, 39, 43 and 44 are also patentable over the *Nielsen* reference.

Independent Claim 48 recites "a server system coupled to the database and operable to: generate a first set of one or more first correlithm objects at a correlithm object generator, each first correlithm object representing a first orthonormal basis vector" and "generate a second set of one or more correlithm objects at the correlithm object generator, each second correlithm object representing a second orthonormal basis vector" (emphasis added). Applicant respectfully submits that *Nielsen* does not disclose or even suggest each and every limitation recited by independent Claim 48. In the Office Action, the Examiner appears to conclude that *Nielsen* discloses generating "a first set of one or more first correlithm objects . . . representing a first orthonormal basis vector" and generating "a second set of one or more second correlithm objects . . . representing a second orthonormal basis vector. In order to arrive at this conclusion, the Examiner refers to the following portion of *Nielsen*:

Suppose V and W are vector spaces of dimension m and n respectively. For convenience we also suppose that V and W are Hilbert spaces. Then $V \times W$ (read ' V tensor W ') is an mn dimensional space vector space. The elements $V \times W$ are linear combinations of 'tensor products' $|v\rangle \times |w\rangle$ of elements $|v\rangle$ of V and $|w\rangle$ of W . In particular, if $|i\rangle$ and $|j\rangle$ are orthonormal bases for the spaces V and W then $|i\rangle \times |j\rangle$ is a basis for $V \times W$.

(*Nielsen*, page 71, line 38). Applicant respectfully submits that *Nielsen* does not disclose generating "a first set of one or more first correlithm objects at a correlithm object generator, each first correlithm object representing a first orthonormal basis vector" and generating "a second set of one or more correlithm objects at the correlithm object generator, each second correlithm object representing a second orthonormal basis vector" (emphasis added). To the contrary, *Nielsen* appears to describe manipulation of tensor products and not "generating . . . correlithm objects." Therefore, for at least these reasons, Applicant submits that *Nielsen* does not anticipate Claim 48.

Independent Claim 51 recites "generating a first set of one or more first correlithm objects at a correlithm object generator, each first correlithm object representing a first orthonormal basis vector" and "generating a second set of one or more correlithm objects at the correlithm object generator, each second correlithm object representing a second orthonormal basis vector" (emphasis added). At least for the reasons discussed above with respect to independent Claim 48, Applicant respectfully submits that *Nielsen* fails to disclose or even

suggest the limitations as recited by Claim 48. Therefore, for at least this reason, Applicant respectfully submits that Claim 51 is also patentable over the *Nielsen* reference.


Claims 2-7, 9-14, 16-21, 23-28, 32-34, 36-38, 40-42, 49-50 and 52-53 that depend respectively from independent Claims 1, 8, 15, 22, 31, 35, 39, 48 and 51 are also not anticipated by *Nielsen* at least because they incorporate the limitations of respective claims 1, 8, 15, 22, 31, 35, 39, 48 and 51 and also add additional elements that further distinguish *Nielsen*. Therefore, Applicants respectfully request that the rejection of Claims 1-44 and 48-53 be withdrawn.

CONCLUSION

Applicant has made an earnest attempt to place this case in condition for immediate allowance. For the foregoing reasons and for other reasons clearly apparent, Applicant respectfully requests reconsideration and full allowance of all pending claims.

A Petition for Extension of Time under 37 C.F.R. § 1.17(a)(1) for a three (3) month extension is enclosed hereto. Attached hereto is a check in the amount of \$510.00 to cover the cost for obtaining the extension. If, however, Applicant has miscalculated the fee due with this response or overlooked the need for any other fee, the Commissioner is hereby authorized to charge any fees or credit any overpayment associated with this response to Deposit Account No. 13-4900 of Munsch Hardt Kopf & Harr, P.C., referencing Attorney Docket No. 9350.7-2.

Respectfully submitted,

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